Factors Influencing Demand for Animal Health Services and Knowledge of Biosecurity Among Livestock Farmers Along Border Villages of South Africa and Namibia

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KEY WORDS: Demand, Animal Health services, knowledge, biosecurity, Farmers, Border Villages South Africa, Namibia

ABSTRACT

This paper examines the factors influencing demand for animal health services by livestock farmers along border villages of South Africa and Namibia. This was due to the high volume of trans- boundary activities particularly with respect to animals. The Northern Cape shares boundary with Namibia. The population of study is all livestock producers in border villages along Northern Cape provinces, a mix of purposive and random sampling were used to select 140 respondents for the study. Data were collected through the use of questionnaires, on farmers' personal and farm characteristics and farmers' knowledge of livestock biosecurity practices. Descriptive statistics were used to analyze farmers' personal and farm characteristics. Regression analysis was used to determine the relationship between livestock farmers' knowledge of biosecurity practices and other study variables. The results show that:

- 32% of the livestock farmers fall within the age 61years
- above 83.6% of the farmers are male
- 56.4% of the farmers are married
- most of the farmers are literate
- 67.9% of the respondents have less than five dependents
- 97.9% of the farmers have livestock based farming system
- 70% reported that they have no contact with an extension agent
- 89.3% have access to market

Farmers personal and farm characteristics were significantly related to the demand for animal health services.

The F value of 2.456 at p=0.05 shows that there was strong correlation between the independent variable and. the demand for animal health service by livestock farmer. The most significant determinant is income (t=2.487). Similarly farmers personal and farm characteristics were significantly correlated to the farmers knowledge of livestock biosecurity practices

INTRODUCTION

Live stock plays an important role in the economies of most developing countries, accounting for one third of their agricultural output.[1] Antenneh[2] reported that the value of commodity output of livestock in sub Saharan Africa is equivalent to 25% of total food production. It not only provides animal protein, but also income, employment, and foreign exchange. Livestock also serves as a source of wealth, provides draught power and organic fertilizer for crop production. In South Africa Livestock occupies an important and integral component of the farming systems which contributes greatly to agricultural and rural development[3]. Livestock production is prominent in the Bophirima Central and Bojanla Platinum districts of South Africa.

While in the North West Province, 80% of the population, mostly women, earn their livelihood from crop and livestock.4 The South African dairy industry provides job directly for about 60, 000 people apart from another 40, 000 who derive their livelihood from processing of dairy products. Eighty five percent of the domestic consumption is produced by the livestock sector, which brought about an enormous reduction in beef importation and thereby saved huge foreign expenditure.

However, despite this enormous economic contribution of livestock to the economy of the developing countries and South Africa in particular, poor animal health is a major impediment to optimal livestock production in many developing countries. Losses due to diseases come in different forms, including:

- death of animals
- medication cost
- condemnation of products at the processing plants
- loss of draught power as a result of weakness
- poor growth
- poor feed conversion, and
- downgrading.

FAO5 reported diseases induced estimated losses of about 30% of annual livestock output in developing countries. Therefore, maximal livestock productivity is a function of high-quality and regularly provided animal health services. Umali et al[6] lay credence to the fact that the availability of quality animal health services can play a significant role in enhancing the productivity of the livestock sector.

The provision of animal health services in SSA has been the responsibility of the state veterinary service.[7,8] However, the growing fiscal pressures have in no small measures reduced the availability and quality of these services to an abysmal level[9]. Yet, animal health care requires more attention now than ever, given the expected increase in animal health related challenges, coupled with climate change induced influences on pasture growth and diseases incidence. Additionally animals of most rural farmers are increasingly becoming more vulnerable to diseases because of the cost, lack, and unsuitable animal health and production inputs.[10] This then implies that the absence of efficient health care delivery systems was also responsible for the prevalence of readily controllable livestock diseases.[7,8,11]. Therefore strengthening the health care delivery system in developing countries will improve the availability and performance of health services.[9] According to[12] the concept "animal health system" is made up of three components:

- the structure
- the process
- the outcome.

The structure is the environment, the process is the interactions between the animal health care/ services provider and the livestock farmers, while the outcome is the effect of animal health care on animals and human .Bossche et al[13] submitted that it is not just the outcome. That is, the extent to which interventions result in to healthy animals and humans that determines the quality of a health service system as assumed in the veterinary service context. Rather, the

availability, affordability, and accessibility of these goods and services which are the necessary inherent parameters in the "structure" and the "process" of the health care system that leads to the good outcome is what determines the quality of the animal health care delivery system.

The implication of this, therefore, is that it is not just the efficacy of the services rendered in terms of preventing and curing diseases. It is in fact the extent to which this system enhances livestock farmers' health management decisions in availing themselves of these health services. It is reported that institutional setting, economic factors along other variables like farmers' and farming characteristics and biophysical factors as having major influences on livestock farmers' health management decisions.

Boschee et al[13] also identified specific functions of livestock within the production system, objectives of the livestock production systems, types of disease, and factors determining trends in the livestock sub sector as a factor influencing demand for animal health services among livestock farmers. An intensifying and market oriented livestock production system leads to increase in demand for animal health services because of the change in the profile of livestock farmers from small scale to commercial farmers[11]. De Haan[14] (1992) reported that the introduction of crossbreed dairy cattle in India and the lean pig policy in China led to change in production system that led not only to increase in demand for animal health services, but also for a specialized type of animal health service. Therefore, community participation is important in livestock farmers' adoption of animal health strategy. Animal health services must be demand driven. Randella et al[15] submitted that identifying factors that influences livestock farmers demand for animal health services have a lot of implications for policy formulation, planning, and extension of livestock disease control programme.

Most livestock diseases are infectious and are contacted in a variety of ways, so livestock diseases are spread when a disease-causing agent escapes from an infected host and travels to a susceptible host. So to minimize losses due to outbreak of animal disease, it becomes necessary to be proactive by putting in place measures will that will make livestock less prone to disease causing agents, or possibly vaccinate, to immunize the animals against any disease invasion.

Biosecurity refers to those measures taken to keep diseases out of populations, herds, or groups of animals where they do not currently exist, or to limit the spread of disease within the herd. A successful biosecurity plan must address isolation of new animals brought to the farm, isolation of sick animals, regulation of the movement of people, animals, and equipment, and procedures for cleaning and disinfecting facilities. The responsibility for farm-level biosecurity belongs to the producer or herd owner[16].

Biosecurity strategies aim to minimise the risk of disease entering the country and, if it does enter, ensure that the outbreak is localised and does not develop into an epidemic. There is need for countries' border agencies and the Quarantine and Inspection Service to upgrade quarantine facilities at international airports and mail centres around the country. FMD-free countries guard against the disease through strict import regulations restricting imports of live cattle and pigs from infected countries—even those using vaccination to control the disease (unless the animals are subjected to a lengthy and controlled quarantine procedure).

Countries that rely on vaccination are treated as if the disease were present as the vaccination produces antibodies that interfere with serological testing and may mask the clinical symptoms of certain diseases.[17] A major approach has been the capability to trace animal movements is vital to bringing the spread of disease under control.[18] A fully implemented National Livestock Identification Scheme (NLIS) would greatly contribute to confining a disease outbreak due to its accurate identification and rapid trace-back capabilities.[19]

Table 1: *Personal and farm characteristics of Livestock farmers*

Personal Characteristics	Description
Gender	Male 83.6%
Age	Mean = 45.6 years
Marital Status	Predominantly married 56.4%
Educational level	Basic and secondary school level 61.4%
No of Dependants	Mean = 3
Farming Experience	Mean = 11.5 years
Source of land	Predominantly through land reform (60%)
Farming system	Predominantly livestock based (98%)
Income	Mean = R 20,000 per annum
Extension contact	Predominantly no contact
Market access	Predominantly accessible
Credit	Predominantly no access

The NLIS is designed to improve tracing and monitoring systems for stock diseases and chemical residues to allow Australian producers to compete on the international market. The European Union (EU) requires strict quality control of livestock sales and full traceability of all cattle slaughtered for their market. Therefore, livestock farmers' knowledge and practice of farm level biosecurity remain a functional index of livestock farmers' competence in preventing the introduction and the outbreak of livestock diseases. This study seeks to understand factors influencing demand for animal health services and knowledge of biosecurity among livestock farmers along border villages of South Africa and Namibia.

MATERIALS AND METHODS

The study was carried out in selected villages of the Northern Cape Province. South Africa has land boundaries: total of 4,862 km; and has land boundaries with countries such as: Botswana 1,840 km, Lesotho 909 km, Mozambique 491 km, Namibia 967 km, Swaziland 430 km, and Zimbabwe 225 km. Land boundaries are the total and individual length for each of the contiguous border countries. When available, official lengths published by national statistical agencies are used.[20] The selection of the study area was due to the high volume of trans- boundary activities, particularly with respect to animals.

The Northern Cape shares boundary with Namibia. Communities were purposively selected based on the concentration of livestock practices, while farmers were randomly selected from each community. The population of study is all livestock producers in border villages along Northern Cape provinces, a mix of purposive and random sampling were used to select 140 respondents for the study. Data were collected through the use of questionnaires on farmers' personal and farm characteristics and farmers' knowledge of livestock biosecurity practices. Descriptive statistics were used to analyze farmers personal and farm characteristics. Regression analysis was used to determine the relationship between the demand for animal health, knowledge of biosecurity, and other study variables.

RESULTS

Table 1 presents the personal characteristics of livestock farmers, while Table 2 shows the farm characteristics among livestock farmers. Table 3 shows multiple regression analysis of the relationship between farmers personal and farm characteristics and farmers knowledge of livestock biosecurity practices

DISCUSSION

Table 1 reveals that majority of the farmers

Table 2: *Multiple regression analysis of the relationship between farmers personal and farm characteristics and farmers demand for animal health services*

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-1145.996	1901.680		-.603	.547
Sex	161.325	633.306	.015	.255	.799
Age	13.403	17.808	.048	.753	.452
Marital Status	-44.286	370.497	-.008	-.120	.905
Household Size	-24.810	85.169	-.016	-.291	.771
Source of Land	-120.509	157.135	-.042	-.767	.444
Farm Size	.107	.086	.075	1.235	.218
Group membership	726.968	522.027	.081	1.393	.165
Extension contact	-356.010	476.155	-.042	-.748	.455
Labour sources	287.414	314.004	.057	.915	.361
Income	.019	.008	.162	2.487	.013
Farming experience	14.721	21.514	.040	.684	.494
R	.277				
R square	.077				
F	2.456				

are:

- predominantly male, married
- with primary and junior high levels of education
- a mean age of 45.6 years
- mean farming years of experience as 11.5 years

It shows that livestock farming is a male dominated enterprise. This agreed with the findings of Randella et al,[15] which reported that dairy cattle keeping is mainly a male domain. This finding tallies with findings of Forsyth et al,[21] which reported that herds were managed by older married men. Hanks et al [22] reported that Fulani women process and market fresh milk as a means of livelihood, and to also improve family income. The mean number of dependent per household was three persons, and the majority had secured their land through allocation from land reform program, practicing a livestock-based farming system. The mean income is R20,000 per annum, with a majority having poor access to extension services and credit. However, respondents indicated access to market although not the mainstream export market.

Table 2 shows the results of multiple regression analysis of the relationships between farmers personal and farm characteristics and the demand for animal health service. The independent Variables were significantly related to the demand for animal health service by livestock farmers. The F value of 2.456 at p=0.05 shows that there was strong correlation between the independent variable and the demand for animal health service by livestock farmer. The significant determinants is income (t=2.487). This finding revealed that income of farmers is a major determinant of their demand for animal health services. It therefore means that farmers will demand animal health service if there is an improvement in

Table 3: *Correlation coefficient between farmers' personal and farm characteristics and knowledge of livestock biosecurity practices*

Variables	r - value
Household size	0.46
Sources of land	0.53
Farm size	0.78
Extension contacts	0.65
Labour sources	0.85
Income	0.77

their income. The R value is 0.277 while the R square is 0.077; this implies that the independent variables predict 77% of the dependent variable.

Table 3 shows the results of the correlation coefficient between farmers' personal and farm characteristics and knowledge of livestock biosecurity practices. Significant and positive relationship are found between household size (r = 0.46); sources of land (r =0.53); farm size (r = 0.78); extension contacts (r = 0.65); labour sources (r = 0.85); and income (r = 0.77). The trend of the positive correlation between knowledge of biosecurity practices and farmers' characteristics shows that these personal characteristics would influence the knowledge of farmers. It is, therefore, important that programs that would improve the knowledge and practice of biosecurity activities should take these significant variables into cosndieration before dissemination to farmers.

CONCLUSION

It is seen from this study that income is a major determinant of livestock farmers demand for animal health services. It therefore becomes important that effort should be put in place to enhance low income livestock farmers access to health service. This can be made possible by subsidizing health services and bringing animal health institutions close to the farmers. Animal health personnel should not only be responsive, but efficient in the treatment of animals, so as to establish the trust of the farmers in the services provided by their outfit.

Livestock farmers also need to be sensitized on the bad impact of livestock diseases on animals, people and the economy, and the need to promptly seek health interventions to forestall outbreak and its grave consequences. Farmers can be encouraged to form themselves into cooperatives so that they can pool their resources together to facilitate easy access to relatively costly animal health services. Livestock extension personnel should emphasize to livestock farmers the importance of availing themselves of animal health services in their domain. Some incentives may be attached to livestock farmers' access of animal health service or a sort of reward for farmers with good record of animal health practices.

Also in a very precautionary manner light sanctions may be applied to livestock farmers in case of disease outbreak, due to negligence of good health practices. Effort should be put in place to improve poor income of livestock farmers. This can be through giving of credits to expand their production base in size or in diversification. Livestock farmers' access to market should also be facilitated to get good price for their product, which will in turn affect their income and invariably facilitate their accessing animal health services. Training should be organized for all categories of livestock farmers, particularly those operating on small scale to keep them abreast of livestock biosecurity practices. Rules regulating movement of livestock and all other management practices should be strictly upheld. Government should recruit more and competent agricultural extension agents, especially livestock extension personnel. Extension agents should also make trainings on biosecurity practices part of their livestock extension packages. There is also a need for a review of livestock biosecurity practices to ensure their effectiveness in forestalling the current trends of animal disease transmission.

ACKKNOWLEDGEMENT

The authors gratefully acknowledge the

financial support from Land and Agricultural Development Bank of South Africa Pretoria for the Land Bank Chair research activities in North West University (Mafikeng Campus)

REFERENCES

1. Upton M, The role of livestock in Economy Development and Poverty reduction ; Pro poor Livestock policy initiative. FAO PPLP working paper no 10. 1-66, 2004
2. Atenneh A. A Livestock and food production in Africa: challenge and opportunity for the national livestock and veterinary services *Rev. sci. tech*. Off. int. Epiz., vol. 8 (3), 591-606. 1989
3. Bembrigde TJ Agricultural development problems in three rural areas of Ciskei, 1987, Development Southern Africa 5 (1): 124 - 126 1988
4. Mabe L K, Antwi M A and Oladele O I: Factors influencing farm income in livestock producing communities of North-West Province, South Africa. *Livestock Research for Rural Development. Volume 22, Article #142*. Retrieved March 9, 2013, from http://www.lrrd.org/lrrd22/8/mabe22142.htm
5. FAO Cost benefit analysis of animal health programme in deloping coutries, FAO expert consultation , 10- 14 September 1990 FAO, Rome.
6. Umali , D. L. and Schwartz, L. Public and Private Agriculture extension, beyond traditional frontiers, World Bank Discussion Paper 236, 1994 The World Bank, Washington DC
7. Walshe M. J Livestock Support services, paper presented at Economic Development Institute Seminar on Organisation of African Livestock services, Paris 25-27 May 1987.
8. Milangwa, Chilonda and Pandey Veterinary Ethics in the liberated in the liberalized market: the Zambian environment. Rev sci tech. off. Int. Epiz; 16(3), 739-745, 1997
9. Holden S, Ashley S, and Bezaley P,. Improving the delivery of animal health services in developing countries. a literature Livestock in Development . Crekweme 96p, 1996
10. Mutambara J. , Mano R. , Chatikobo P. and Masvong J. Proximate determinants of the effective demand for animal health services in smallholder sector of Zimbabwe Livestock Research for Rural Development 24 (10) 2012 Retrieved March 8, 2013, from http://www.lrrd.org/lrrd24/10/muta24178.htm
11. FAO The population parameters of rural development, Food and Agriculture Organisation, Rome. pp 40-55 1995 http://www.fao.org/docrep/x0252e/x0252e01.htm#P31_2974
12. Milangwa and Ksauzi System approach to animal health services delivery in sub Saharan Africa; concept development. Rev sci. tech. off. Epiz, 13 (3), 665-672 , 1994
13. Bosche Van den P., Thys E., Marcotty T. and Geert S. The provision of animal health care to small holders in Africa: an analytical approach. Rev. sci. tech. Off. Int. Epiz.,23 (3) 851-861, 2004
14. De Haan C. Development support and livestock in Wilson R T, Ehui S and Mack S (eds). 1995. Livestock Development Strategies for Low Income Countries. Proceedings of the Joint FAO/ILRI Roundtable on Livestock Development Strategies for Low Income Countries, ILRI, Addis Ababa, Ethiopia, 27 February-02 March 1995. Food and Agriculture Organization/International Livestock Research Institute, Nairobi, Kenya
15. Randella R., Lienbenberg G. F, Kirsten J. F, and Townsend R. F . Demand for tick control services in the Venda region of Northern Province: Agrekon, Vol 39, No 4. 644-646, 2000
16. CIA Fact Book, South Africa Land boundaries. http://www.indexmundi.com/south_africa/land_boundaries.html. 2012
17. Oladele O I and Moilwa M N: Cattle farmers' willingness to establish private grazing lands in Mahalapye, Botswana. *Livestock Research for Rural Development. Volume 22, 2010 Article #159*. Retrieved March 9, 2013, from http://www.lrrd.org/lrrd22/9/olad22159.htm
18. Hanks J, Oakley R, Opoku H, Dasebu S, Asaga J. Assessing the Impact of Community Animal Health Care Programmes: Some Experiences from Ghana. Accra, Ghana: Veterinary Epidemiology and Economics Research Unit, Department of Agriculture, University of Reading, Reading, UK, and the Livestock Planning and Information Unit, Veterinary Services Department, Ministry of Food and Agriculture; 1999Duguma B. Kechero Y, and Janssens G. P. J,. (2012) Survey of Major Diseases Affecting Dairy Cattle in Jimma Town, Oromia, Ethiopia: Global Veterinaria 8 (1): 62-66, 2012.
19. Gary L. Bowman, D.V.M. and William P. Shulaw, D.V.M. On-Farm Biosecurity: Traffic Control and Sanitation, Ohio State University Extension Factsheet, 6/2001 http://ohioline.osu.edu/vme-fact/0006.html 2001
20. CIA Fact Book, South Africa Land boundaries. http://www.indexmundi.com/south_africa/land_boundaries.html. 2012
21. Forsyth, Jr KW & Bredahl, ME, 'Strengthening import regulations segments world markets', *Food Review, vol. 15, no. 1*, pp. 2-7. 1992
22. NSW Agriculture, 'Managing animal disease emergencies', Performance Audit Report, accessed 14.3.12 www.audit.nsw.gov.au/perfaud-rep/AgricultureEmergency-May2002/AnimalDiseases-May2002.pdf
23. MLA (Meat & Livestock Authority), 'About the NLIS', accessed 13.8.03, http://www.mla.com.au/content.cfm?sid=1350. 2003